REMARKS/ARGUMENTS

This Response is accompanied by a Request for Continued Examination.

The Examiner had argued in the last Response that the then newly submitted claims 11-20 were directed to an invention that was independent or distinct from the invention originally claimed. Without conceding that the Examiner's analysis and effective restriction of the previous claims is correct, it is now submitted that the claims as amended do indeed relate to one invention. The Examiner had argued that claims 11-16 included a constant operational characteristic that was different from the operational characteristics specified in other claims, e.g. the subject matter of claims 1-2, 4-7 and 9-10.

All of the independent claims are being amended, so as to be directed to a system or method in which the at least one fuel cell peripheral is subject to a constant operational characteristic. Thus, this amendment is being introduced into claim 1, claim 6, claim 11, claim 15 and claim 17. While the Examiner had interpreted claims 11-16 as including a constant operational characteristic, for the avoidance of doubt and for consistency, all of these claims now refer to an operational characteristic that is "respective, different and constant", to make it clear that the intent of the invention is to provide for such an operational characteristic, a value that is constant for each operating range with the constant values being different from one another.

Accordingly, it is submitted that the claims as amended do indeed relate to a single invention.

Objections to the Specification

The Examiner had objected to the previously submitted amendment under 35 U.S.C. 132(a) on the ground that the reference to "actual power output" introduced new matter. In response, the term "actual" is being deleted from claims 2 and 7.

It is submitted that this amendment necessarily addresses the rejection of claims 2 and 7 under 35 U.S.C. 112.

Other Rejections Under 35 U.S.C. 112

The Examiner had rejected claims 1-2, 4-7 and 9-12 under 35 U.S.C. 112, second paragraph for a variety of reasons.

In claim 1, the Examiner argued that there was insufficient antecedent basis for the phrase "the power output" in line 5, and this claim has now been amended to provide a clear antecedent for this term in line 2 of the claims.

With respect to claim 10, the Examiner had argued that there was insufficient antecedent basis for the limitation "the levels" in line 2 of the claim. It is now specified, in lines 1 and 2 of the claim that "the fuel cell operation characteristic spectrum has a plurality of levels, and...". Accordingly, it is submitted that this amendment fully overcomes this rejection.

The Examiner had argued that claim 9 was incomplete, within the meaning of 35 U.S.C. 112, second paragraph, for omitting essential steps. It would appear that the difficulty here is due to the labeling of the steps as: (a), (b), (c), etc. In response, claim 9 has been amended to refer to steps (c) and (d), rather than steps (b) and (c). Further, the reference to "comprises" (two occurrences) in claim 9 has been amended to read "further comprises". It is submitted that these two amendments fully address the Examiner's concerns with respect to claim 9.

Claim Rejections - 35 U.S.C. Section 102

Claims 1-2, 4, 6-7 and 9 stand rejected under 35 U.S.C. 102(e) as being anticipated by Blum et al. Claims 1 and 6 also stand rejected under 35 U.S.C. 102(b) as being anticipated by Harashima. Additionally, claims 1-2, 4-7 and 9-10 stand rejected under 35 U.S.C. 102(c) as being anticipated by Ueda et al. The Examiner had additionally provided a lengthy response to arguments previously submitted by the Applicant.

The claims are now being amended to specify that the operational characteristics for the fuel cell peripheral are different and constant for each range within the fuel cell operation characteristics spectrum. Thus, with reference to the example in the description and shown in Table 1 on page 15 of the application, the intention is to simplify management and operation of fuel cell peripherals, while

simultaneously reducing parasitic losses or loads from these fuel cell peripherals, particularly when a fuel cell stack is running at low output levels. As suggested in Table 1, peripherals such as the hydrogen purge valve and a fan or blower providing hydrogen recirculation can be set to different and constant levels depending upon the output from the fuel cell stack. This then avoids any requirement to continuously monitor stack output and continuously vary the level of operation of such peripherals in dependence upon the stack output; rather, with the present invention, a simplified scheme is provided where a number of different, constant and discrete levels of operation are provided for such peripherals.

Turning to the specific rejection of the claims, the Examiner had argued that, the Blum et al. proposal anticipated claims 1-2, 4, 6-7 and 9. More specifically, the Examiner argued that the Blum et al. proposal employs "a relationship between the current demand and the fuel mass flow as a function of time to control and operate the fuel cell system". The Examiner cited Figure 3 of Blum. This simply shows that the fuel supply is varied in dependence upon a target current. Nowhere does it suggest a scheme as now claimed in the present invention, as explained in the preceding paragraph.

With respect to the dependent claims, it is submitted that these are allowable as being dependent from an allowable main claim and for introducing further patentable features. With respect to claims 4 and 9, the Examiner argued that Blum disclosed that the controller controls a system based upon or using measured values or calculator values of the mass flow of the fuel gas. Again, nowhere does Blum suggest a scheme where specific set and constant values are provided for operating fuel cell peripherals, correlated with ranges of operation for the fuel cell itself.

The Examiner then rejected claims 1 and 6 as being anticipated by Harashima, citing Figure 6 of Harashima. Harashima seems to be particularly concerned with transients in power demand and how this is handled. Again, there is no disclosure of a control scheme as now defined in the present claims.

The Examiner then cited Ueda et al. as anticipating claims 1-2, 4-7 and 9-10.

In relation to claims 1 and 6, the Examiner argued that Ueda et al. disclosed a control scheme where a power control unit controls the flow rate of hydrogen and the flow rate of air supply such that the flow rates can be optimum values. The Examiner argued that "Ueda et al. show with sufficient specificity to control the flow rate of reactant in response to output power requirements." Again, it can simply be noted that Ueda et al. is entirely silent on any scheme as now defined in the present claims, in which a number of set and constant operating levels for the fuel cell peripherals are provided.

With respect to the dependent claims, it is again submitted that these are allowable for introducing further patentable features and for being dependent from allowable independent claims.

The Examiner argued, with respect to claims 2 and 7 that Ueda et al. teach the control of the flow rate of reactants in response to output power requirements. Again, without acknowledging the correctness of this statement, it is noted that this patent does not teach providing discrete levels of operation for fuel cell peripherals, corresponding to different operating ranges in the stack itself. Similar comments apply to claims 4 and 9. With respect to claims 5 and 9, there is no discussion of providing a specific level of operation for fuel cell peripherals corresponding to an idle level for the fuel cell stack.

Comments on Examiner's Response to Applicant's Arguments

In paragraph 15, the Examiner argued that the following feature, taken from Applicant's previous arguments, was not present in the claims: "are divided into two ranges, which typically can be from 0 to some mid-point and from that mid-point to a maximum value". It is noted that the claims clearly do include: "each fuel cell operation characteristic spectrum is divided into at least two ranges indicative of at least two corresponding ranges of power output". While this language may not track exactly the previously quoted statement and while the reference to 0, mid-point to maximum values was only included by way of example, it is clear that the claims do require the presence of at least two distinct ranges for the fuel cell operation characteristic spectrum.

In paragraph 16, the Examiner rejected Applicant's argument that "none of the prior art was concerned with operating fuel cell peripherals". Without acknowledging the validity of this position, it is noted that, for example, claim 1 refers to fuel cell peripherals selected from "a coolant recirculation pump, a hydrogen recirculation pump, and a hydrogen purging means". The significance of this is that these are peripherals that are not central to the operation of the fuel cell and which can be operated at different levels, independent of the level of operation of the fuel cell stack itself. For example, supply of the reactants to a fuel cell, clearly, must, to at least some extent, be closely related to the level of operation of the stack itself. Indeed, in a closed ended or dead ended system, supply of the reactants must correspond exactly to the power output; even in a system with recirculation, over any reasonable time frame, reactants are consumed, then supply of reactants must correspond to the power output. On the other hand, functions such as purging cycles, rate of recirculation, etc., can be varied, to at least some extent, independently from the level of power generated. It is this feature which enables these fuel cell peripherals to be operated at fixed and constant levels, over fairly wide ranges of power output. It is this realization which leads to the simplification of the present invention, as now defined in the claims.

In paragraph 17, the Examiner argued that he "strenuously contends that having an anode "outlet" or anode exhaust is a conventional structural and functional requirement for the type of fuel cell disclosed by Blum et al.". Having an anode exhaust is by no means always conventional. A search of the Internet will show that there are numerous references to "dead-ended" operation of fuel cell stacks. This is possible if pure reactant supplies are used, so that, after consumption of the reactants, there are no residual or waste gases present. Accordingly, it is submitted that the Examiner cannot argue that this is a necessary, implicit teaching of Blum et al., in effect reading into Bum et al. a feature of the present invention; rather, the Examiner must locate and cite a reference disclosing this feature.

In paragraph 18, the Examiner argued that someone skilled in the art could immediately recognize that a fuel cell operation must include at least two different operating loads. While fuel cell stacks or systems may be operable at different levels and in different modes, what is missing from the art is any realization how this can be

used to simplify operation of fuel cell peripherals. The common teaching in the art is that operation of peripherals should be some continuously varying function of some characteristic of the operation. There is no express teaching that one can operate at a number of different, constant and discrete levels, each corresponding to some range of the operation and spectrum of the stack itself. In paragraph 19, the Examiner referred to Blum et al. mentioning the use of "proportional controls", which would seem to require that some operational characteristics do indeed vary "proportionally" in response to some measured characteristic of the fuel cell operation, contrary to the teaching of the present invention.

In paragraph 21, the Examiner argued that Applicant's previous comments concerning operation of peripherals that are "independent of the load requirement" refers to elements not found in the claims. Since claim 1 now specifically refers to three different peripherals which, it is submitted are independent of the load requirement, Applicant maintains that the original point made is valid and applicable.

In paragraph 22, the Examiner remarked that he did not understand that comment that Ueda et al. is not concerned with "controlling peripheral devices which are not devices concerned with supplying reactants...". The hydrogen recirculation pump and hydrogen purge means, while being concerned with controlling internal flow of hydrogen within a fuel cell power system, are not, fundamentally concerned with the supply of hydrogen fuel to the overall system itself.

Similar comments apply with respect to the points made in paragraph 23 of the Action. The Examiner argued that all three of the cited references one way or another "disclose, suggest or teach the importance of maintaining suitable harmonization among all components of the fuel cell system". In general, the teaching of these references is concerned with the supply of fuel to the overall stack or system. Again, they do not disclose a concept of a hydrogen purging means and control of a hydrogen purging means as taught by the present invention and as now defined in the claims.

Finally, it is submitted that Applicant's amendments and arguments are fully in compliance with 37 C.F.R. 1.111(b) and (c).

Accordingly, early review and allowance of the claims is requested.

Respectfully submitted,

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